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18 December 1964

SUBJECT: Flotation Tests [redacted] 25X1

PURPOSE: Primary: To determine if a Rucksack flotation apparatus is required in the Cygnus survival kit complex.

Secondary: To provide additional information on water survival techniques.

EQUIPMENT:

Full Pressure Suit (Cygnus)

NASA Life Raft

Cygnus Seat Kit

Rucksack, with Flotation Apparatus

Cygnus Survival Components

Parachute Harness and Container

Medical Equipment

PERSONNEL: 25X1

[redacted]

PERTINENT INFORMATION:

1. Previous tests indicated the seat kit would submerge when filled with lead shot or gradually sink with normal survival kit components. (Weight of kit components - 50 lbs) In the event of water bailout and raft inflation was faulty, the seat kit would sink and act as a sea anchor possibly submerging the subject. To prevent the rucksack and survival items from submerging, the Rocket Jet Company devised gravity inflated flotation tubes to maintain seat kit flotation.

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2. Test: The subject donned the full pressure suit in one boat and entered the water with the parachute harness, raft, seat kit and components. (The second boat functioned as rescue boat) The raft was not inflated. Although the survival kit did not sink until it was allowed to leak, it was found that a minute opening would cause the rucksack and components to sink. (It was felt the uninflated inner tube flotation device allowed considerable flotation).

3. With the rucksack and contents submerged and attached to the subject, the subject (with extreme difficulty) remained floating and inflated the NASA raft manually.

4. With the rucksack flotation gear activated and survival gear floating the subject had no difficulty remaining afloat and manually inflating the raft.

5. The subject then attempted to enter the inflated raft with the parachute harness on. The restraint and loss of mobility caused from the harness delayed his entery into the raft. No difficulty was encountered with the harness removed.

6. The subject then removed all attachments to survival gear and deflated the suit flotation bladder. (Deflation was difficult due to the pressure of the flotation device against the suit outer garment thus occluding the oral inflation tube) The accessory flotation packet (small water wings) were inflated in an attempt to support the subject.

7. The subject was removed from the water after 46 minutes exposure.

FINDINGS AND RECOMMENDATIONS:

1. The rucksack flotation bladder as a supplementary seat kit flotation device is a requirement. Although the seat kit with survival components tended to float, the entrance of some water into the rucksack would submerge the kit. In the event of raft failure a submerged rucksack could drown the subject. If the raft inflated properly a submerged rucksack would not be as hazardous, but survival gear would be difficult to retrieve into the raft when survival components were required by the pilot.

2. The use of the accessary flotation device (Res Q Pak) for floating a pilot with a malfunctioning suit floation bladder is marginal. At least two floation devices would be required for adequate flotation.

3. The oral inflation tube of the suit should be modified to prevent occlusion of the tube from pressure of the inflated suit flotation bladder. Pressure resistant tubing is suggested. Exposure of the oral inflation tube is difficult after inflation of suit flotation gear. David Clark should investigate.

4. The parachute harness should be removed before a pilot enters the raft; the harness should not be removed if the raft fails to inflate. The parachute harness on the pilot forces him to float face up even in a relaxed position; without the harness the subject may float face down (if unconscious).

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5. The expected survival time of two to twenty-four hours in 60°F water may be erroneous. After 46 minutes in 61°F water the subject becomes extremely cold and somewhat cyanotic.

6. The diameter of the rucksack flotation tube can be reduced in size and still support the survival components. A reduction in diameter of the tube would allow increased area required for survival items.

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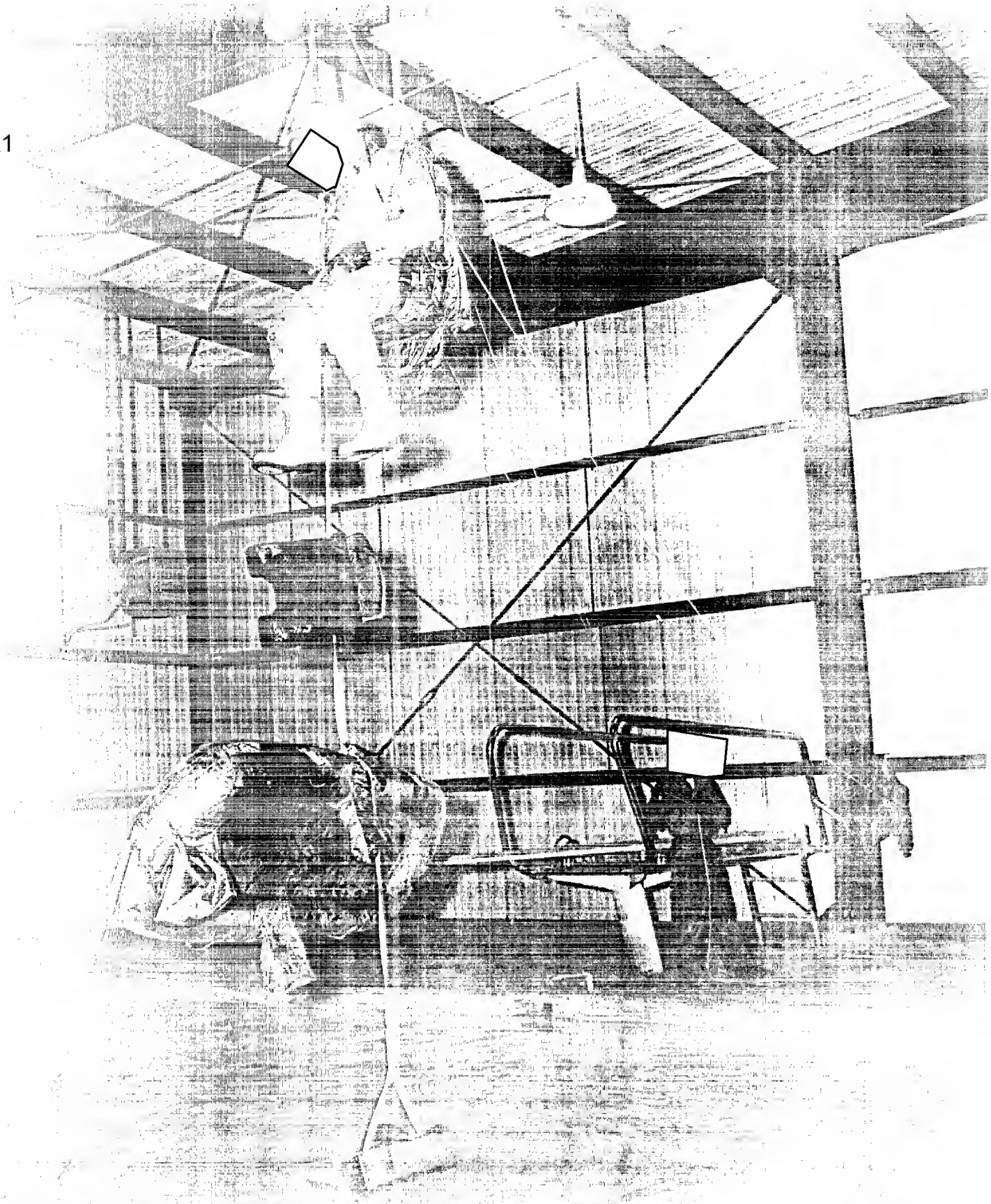

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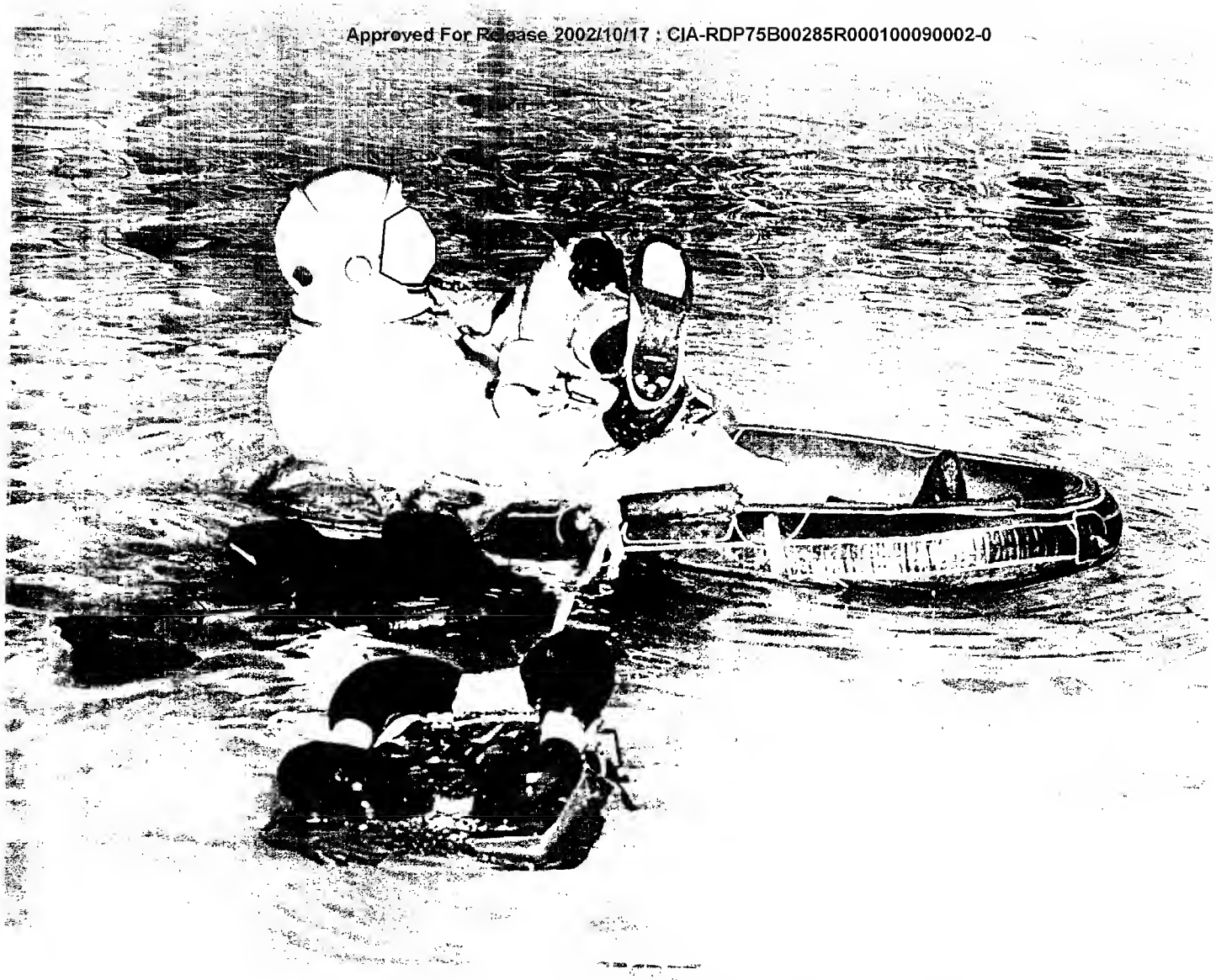

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